

In conclusion, I would like to say a few words about collecting these puzzling shells. In common with others of the family, they arrive at maturity in the spring, and the adults are generally dead by midsummer. Those taken later in the season will be young and immature. It is more difficult to collect in the spring, when the water-courses are full to overflowing, but I have had little trouble since adopting a simple suggestion from my friend, George J. Streator, of Garrettsville, O. An ordinary wire dish-cover tied to a long pole is an effective scoop, and the meshes are fine enough to prevent the escape of small shells, while yet the mud can be washed out. Young shells will often be found within the adults, and should be saved, because in making exchanges, a set showing various stages of growth is the most useful for study and comparison.

NEW VARIETIES OF WESTERN LAND SHELLS.

BY HENRY HEMPHILL, SAN DIEGO, CAL.

Helix ptychophorus var. *castaneus* Hemphill.

Shell umbilicated, globosely depressed, of a dark chestnut color; surface covered with coarse, irregular, widely separated lines of growth, and crowded, microscopical revolving lines; whorls $5\frac{1}{2}$, convex, the last slightly descending in front, spire elevated; suture well impressed, aperture subcircular; lip white, reflected and partially covering the umbilicus, its terminations approaching; umbilicus small and deep.

Height $\frac{5}{8}$ inch, diameter 1 inch.

Habitat, Old Mission and Rathdrum, Idaho.

I regard *H. ptychophorus* as the progenitor of what I call the *Townsendiana* group of west coast land shells, and this colored variety seems to still further indicate its relationship to *Townsendiana*, for the spire whorls of nearly all the specimens of *Townsendiana* that I have collected are chestnut colored. *Townsendiana* does not begin to put on its wrinkles until it has made about four revolutions of the shell. The wrinkles are probably due to its environment.

Helix tudiculata var. *subdolus*, Hemphill.

Shell narrowly umbilicated; globosely depressed, of a dark yellowish color, surface somewhat shining, covered with oblique striæ,

interrupted by numerous wavy lines and oblong blister-like wrinkles, hardly perceptible to the naked eye; whorls $5\frac{1}{2}$, convex, striped by a single chestnut band, double margined by lighter ones; spire very little elevated, suture well impressed; lip simple reflected, and nearly covering the umbilicus, its terminations approaching and joined by a thin callus; umbilicus narrow and small.

Height $\frac{5}{8}$ inch, greatest diam. 1 inch, lesser $\frac{7}{8}$ inch.

Habitat San Jasinto Valley, San Diego Co., Calif.

A very depressed form, quite variable in size, some of the specimens not being more than half the size of the measurements given. It is lighter colored than any of the southern varieties of *tudiculata*, except var. *Binneyi*.

Selenites Vancouverensis, var. Keepi, Hemphill.

Shell umbilicated, greatly depressed, thin, smooth, shining transparent, scarcely marked by the delicate wrinkles; very light horn color; whorls over four, somewhat flattened above and beneath, and scarcely descending at the aperture; spire flat, not rising above the body-whorl; suture well impressed; umbilicus moderately large, exhibiting most of the volutions; aperture transversely subcircular, wider than high; lip simple, thickened, sinuous above, very slightly reflected at the base, ends scarcely approached.

Width $\frac{5}{16}$ inch, height $\frac{1}{16}$ inch.

Habitat, Hills near Oakland, California.

One specimen only.

This rare and interesting little shell I collected some years ago. It is a perfect miniature form, in every respect, of *S. Vancouverensis*. I regard it as an extremely small variety of that so-called species. It is about the size of the variety of *S. Durante* lately described as *S. calata* Mazyek, but differs very materially in form, sculpture and the general texture of the shell. It differs from var. *Catalinensis* in being more robust, larger, and has a smaller umbilicus. I dedicate this pretty little shell to Prof. Josiah Keep of Mills College, California, who has done so much through his interesting little book to stimulate the study of West Coast shells.

Selenites Vancouverensis var. hybrida Hemphill.

Shell broadly umbilicated, depressed, slightly convex above, surface shining, polished, of a dark yellowish-green color, lines of growth coarse, rib-like and regular on the spire, finer and more irregular on the body-whorl, crossed by fine revolving lines that be-

come fainter on the last whorl, suture well impressed; aperture rounded, broader than high, greatly indented above; lip simple, very little reflected below at its junction with the columella, very sinuous above, its terminations joined by a very thin callus.

Height $\frac{3}{8}$ inch, breadth 1 inch.

Habitat, Astoria, Oregon.

In the strong rib-like sculpturing of the spire, depressed form and sinuous lip, it resembles *sportella*. In its greater diameter, dark greenish color, and the absence of the decussating sculpture on the last whorl it approaches *Vancouverensis*.

All our American *Selenites* commence life with a finely granulated shell. When they have attained about two whorls the striae begins to appear and increase in strength as the shell increases in size.

It is well known that all shell-bearing mollusks construct their shells, in obedience to the laws of their constitutional characteristics and the environment, among which I include affinity of matter and mechanical skill, the later a faculty possessed to a greater or less degree by all animals. Some individuals in a colony of shells display greater mechanical skill than others, or possess stronger imitative powers, and closely follow the lines and styles of their forefathers, strictly attending to the details of sculpturing, not omitting a rib or line. Other individuals of the same colony, not having this imitative faculty so strongly developed, may change or vary the form of the shell by constructing it with more convex whorls generally resulting in a narrower or more elevated shell; or they may flatten the whorls, resulting in a broader and depressed form. Some modification of the umbilicus generally follows the change in the form of the shell. In both cases the sculpturing may be what we call characteristic of the species, or may be more or less modified, by the omission of one, two or more ribs, or the ribs may be more irregular in shape. A few lines may also be dropped, perhaps some added, or the entire surface may be modified in obedience to the laws of the mechanical skill possessed by the individual, and the affinity of matter secreted by the animal for the purpose of constructing the shell. An examination of a large number of *Selenites concava* and of our west coast forms, convinces one that the entire group of American *Selenites* is the offspring of a single common type.